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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHUNPEI YAMAZAKI, YASUHIKO TAKEMURA and HONGYONG ZHANG

Appeal 2008-4232
Application 09/917,633
Technology Center 2800

Decided: October 21, 2008

Before BRADLEY R. GARRIS, TERRY J. OWENS, and THOMAS A. WALTZ, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

The Appellants appeal from a rejection of claims 1-4, 6, 7, 9, 10 and 12, which are all of the pending claims. We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

The Invention

The Appellants claim a transistor. Claim 1 is illustrative:

1. A transistor comprising:

a metal advanced lateral crystallization region formed on a substrate with a semiconductor material and including a channel region; and

a plurality of metal advanced crystallization regions formed on sides of the metal advanced lateral crystallization region with a semiconductor material, wherein at least one boundary between the metal advanced lateral crystallization region and one of the metal advanced crystallization regions is located outside the channel region.

The Reference

Oka (as translated)	JP 2-140915	May 30, 1990

The Rejections

The claims stand rejected as follows: claims 3, 4, 6, 7 and 9 under 35 U.S.C. § 112, written description requirement, and claims 1-3, 10 and 12 under 35 U.S.C. § 102(b) over Oka.

ISSUE

The issue is whether the Appellants have shown reversible error in the Examiner's rejection of the Appellants' claims.

PRINCIPLES OF LAW (PL)

35 U.S.C. § 112, first paragraph, written description requirement

1. A specification complies with the 35 U.S.C. § 112, first paragraph, written description requirement if it conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, the inventor was in possession of the invention. *See Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991); *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983); *In re Edwards*, 568 F.2d 1349, 1351-52 (CCPA 1978); *In re Wertheim*, 541 F.2d 257, 262 (CCPA 1976).

Anticipation

2. "Anticipation requires that every limitation of the claim in issue be disclosed, either expressly or under principles of inherency, in a single prior art reference." *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1255-56 (Fed. Cir. 1989).

FINDINGS OF FACT

1. Oka discloses a method for making a semiconductor device such as a thin film transistor wherein a metal layer (103) is formed on an amorphous silicon layer (102) and then is removed except for seed regions (104) (p. 6; Fig. 1(b)).
2. Oka's heat treatment forms crystal nuclei where the seed regions contact the amorphous silicon layer. *See id.*
3. Oka's heat treatment temperature is sufficiently low that crystal nuclei are not generated in areas of the amorphous silicon layer which do not contact the seed regions (p. 6-7).[1]
4. Oka's heat treatment then is used to convert the amorphous silicon layer to a crystalline silicon layer by lateral crystal growth using the seed crystals as a starting point (p. 7-8; Fig. 1(c)).
5. Oka's crystalline silicon layer is patterned to form thin film transistor source, drain and channel regions (p. 8; Fig. 1(d)).

ANALYSIS

We reverse the rejection under 35 U.S.C. § 112, first paragraph, and affirm the rejection under 35 U.S.C. § 102(b).

Rejection under 35 U.S.C. § 112, first paragraph

[1] The Appellants use a low temperature to form seed crystals for the same reason as Oka (Spec. 3).

The Examiner states that the Examiner considers the Appellants' source and drain regions 16A and 16B (Fig. 1B) to correspond to the Appellants' metal advanced crystallization regions located outside the channel region (below gate electrode 14, Fig. 1A, Spec. 8), and considers the channel region under gate electrode 14A (Figs. 1A, 1B) to correspond to the Appellants' metal advanced lateral crystallization region (Ans. 3-4). The Examiner argues (Ans. 4):

> [I]f a metal advanced lateral crystallization region includes a channel region as claimed in claim 1 and also source and drain regions (16A, 16B) as claimed in claim 3, then one skilled in the art would wonder where the plurality of metal advanced crystallization regions are formed. One skilled in the art cannot assume each source region (16A) has two portions or each drain region (16B) has two portions, wherein one portion of source (drain) region is a metal advanced crystallization region and another portion of source (drain) region is a metal lateral crystallization region because Fig. 1B shows source region 16A (or drain region 16B) having only one portion.

The Appellants' Specification indicates that the metal advanced crystallization regions are the regions where nickel or nickel silicide films (17A and 17B, Fig. 1B; 27A, 27B, Fig. 2B) are formed in holes in a silicon oxide film (13, 24), where annealing initiates crystallization which advances laterally from each of those regions toward the center (Spec. 2-3, 7, 9, 14-15). The metal advanced lateral crystallization region is the region between the metal advanced crystallization regions. Thus, the Appellants' original disclosure indicates that the Appellants were in possession of a transistor having the metal advanced crystallization regions and the metal advanced lateral crystallization region recited in claim 1.

The Appellants' claim 3 requires that "the metal advanced lateral crystallization regions include source and drain regions", not that the metal advanced lateral crystallization regions include the entire source and drain. The source and drain regions that are part of the metal advanced lateral crystallization region are the regions between the portions of the source and drain that are in the metal advanced crystallization regions.

Regarding claim 4, which requires that "the metal advanced lateral crystallization region includes no dopant portions formed on sides of the channel region", the Examiner argues that the Appellants' source and drain regions (16A, 16B), which are doped, do not include a portion that is not doped (Ans. 4-5).

The Appellants' channel region is the region under gate electrode 14 (Spec. 8). The channel region and the impurity regions on each side of the channel region are offset by the region between the arrows in Fig. 1B (Spec. 7). Hence, the Appellants' original disclosure indicates that the Appellants were in possession of a transistor having a metal advanced lateral crystallization region including a no dopant portion on sides of the channel region.

With respect to claims 6, 7 and 9 that require a second source portion adjacent to a first source portion, and a second drain portion adjacent to a first drain portion, the Examiner argues that only one source and drain are shown in the Appellants' Figure 1B (Ans. 5).

Written descriptive support for the Appellants' adjacent first and second source regions and adjacent first and second drain regions is found in Figures 2B-2D (Spec. 9).

Hence, the Examiner has not established a prima facie case of lack of adequate written descriptive support for the inventions claimed in the Appellants' claims 3, 4, 6, 7 and 9.

Rejection under 35 U.S.C. § 102(b)

The Appellants argue claims 1-3, 10 and 12 as a group (Br. 12-13). We therefore limit our discussion to one claim in that group, i.e., claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2007).

The Appellants argue that even if seed regions 104 could be characterized as metal advanced crystallization regions, Oka appears to remove them before forming the transistors (Br. 13).

Oka teaches that metal layer 103 is removed to prevent abnormal diffusion of the metal into the amorphous silicon at the high temperature subsequently used to convert the amorphous silicon layer into a crystalline layer (p. 7), but Oka does not disclose that seed crystals 104 are removed. Regardless, the Appellants' claim 1 does not require that metal used to form seed crystals is present in the transistor. That claim merely requires metal advanced crystallization regions, which can be regions at which metal is present until seed crystals are formed, after which seed crystal formation the excess metal is removed. That claim interpretation is supported by the Appellants' Specification which states that excess metal used to form seed crystals is removed (Spec. 4). Moreover, the holes that need to be created through the Appellants' silicon oxide film for electrodes 19A and 19B appear to be at the locations formerly occupied by the nickel or nickel silicide films 17A and 17B used to form the seed crystals (Spec. 7; Figs. 1B, 1C).

We therefore are not persuaded of reversible error in the rejection under 35 U.S.C. § 102(b).

CONCLUSIONS OF LAW

The rejection of claims 3, 4, 6, 7 and 9 under 35 U.S.C. § 112, written description requirement, is reversed. The rejection of claims 1-3, 10 and 12 under 35 U.S.C. § 102(b) over Oka is affirmed.

DECISION/ORDER

It is ordered that the Examiner's decision is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

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